

IN THE CLAIMS:

Please amend claims 13-15, 17-20, 24 and 29 as follows:

Claims 1-12 (Withdrawn).

C
Claim 13 (Currently Amended): A chemical solution preparation apparatus comprising:

~~a gas supply line for supplying a chemical gas;~~


~~a liquid supply line for supplying a liquid, which is one of pure water or a mixture having a predetermined composition;~~

a dissolution unit connected to a preparation tank for storing a liquid, which is one of pure water or a mixture having a predetermined composition, for dissolving ^athe chemical gas, which is supplied from a gas supply, in the liquid to prepare a chemical solution; and

at least either one of a gas discharge control unit for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid during the gas dissolving to increase the purity of the chemical solution and a liquid discharge control unit for discharging a predetermined amount of the chemical solution, ~~which is prepared by dissolving;~~ and during the gas dissolving to increase the purity of the chemical solution

~~a controller for simultaneously operating the dissolution unit and at least one of the gas discharge control unit and the liquid discharge control unit.~~

Claim 14 (Currently amended): The preparation apparatus according to claim 13, ~~further comprising a preparation tank in which the chemical solution is prepared, and~~ wherein the dissolution unit includes ~~a gas supply unit~~ a bubbler element for forming bubbles of the chemical gas in the preparation tank to dissolve the chemical gas in the liquid.

 Claim 15 (Currently amended): The preparation apparatus according to claim 13, wherein the gas supply unit includes a first pipe for supplying the chemical gas to the preparation tank and a flow controller arranged in the first pipe ~~a flow controller arranged in the gas supply line.~~

Claim 16 (Previously amended): The preparation apparatus according to claim 14, further comprising a cooling unit for cooling the liquid in the preparation tank.

Claim 17 (Currently amended): A chemical solution preparation apparatus comprising:


a gas supply line for supplying a chemical gas;

a liquid supply line for supplying a liquid, which is one of pure water or a mixture having a predetermined composition;

a dissolution unit connected to a preparation tank for storing the liquid for dissolving the chemical gas in the liquid, wherein the dissolution unit includes ~~a preparation tank in~~

~~which the chemical solution is prepared and~~ a gas supply unit for forming bubbles of the chemical gas in the preparation tank to dissolve the chemical gas in the liquid; and

at least either one of a gas discharge control unit for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid and a liquid discharge control unit for discharging a predetermined amount of the chemical solution, wherein one of the gas discharge control unit and the liquid discharge control unit is operated at substantially the same time as the dissolution unit;

 a cooling unit for cooling the liquid in the preparation tank, wherein the cooling unit includes a pump for circulating the chemical solution between the preparation tank and a second pipe and a cooling element connected to the second pipe.

Claim 18 (Currently Amended): A chemical solution preparation apparatus comprising:

a gas supply line for supplying a chemical gas;

a liquid supply line for supplying a liquid, which is one of pure water or a mixture having a predetermined composition;

a dissolution unit connected to a preparation tank for storing the liquid, for dissolving the chemical gas to the liquid, wherein the dissolution unit includes ~~a preparation tank in which the chemical solution is prepared and~~ a gas supply unit for forming bubbles of the chemical gas in the preparation tank to dissolve the chemical gas in the liquid; and

at least either one of a gas discharge control unit for discharging an adjusted

amount of the chemical gas that was not dissolved in the liquid and a liquid discharge control unit for discharging a predetermined amount of the chemical solution, wherein one of the gas discharge control unit and the liquid discharge control unit is operated at substantially the same time as the dissolution unit;

a cooling unit for cooling the liquid in the preparation tank , wherein the cooling unit includes a cooling element connected to the preparation tank and a pump for circulating the chemical solution between the preparation tank and the cooling element.

Claim 19 (Currently amended): A chemical solution preparation apparatus comprising:

a gas supply line for supplying a chemical gas;

a liquid supply line for supplying a liquid, which is one of pure water or a mixture having a predetermined composition;

a dissolution unit connected to a preparation tank for storing the liquid for dissolving the chemical gas in the liquid, wherein the dissolution unit includes ~~a preparation tank in which the chemical solution is prepared~~ and a gas supply unit for forming bubbles of the chemical gas in the preparation tank to dissolve the chemical gas in the liquid; and

at least either one of a gas discharge control unit for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid and a liquid discharge control unit for discharging a predetermined amount of the chemical solution, wherein one of the gas discharge control unit and the liquid discharge control unit is operated at

substantially the same time as the dissolution unit;

a cooling unit for cooling the liquid in the preparation tank; and

a gas cylinder containing liquefied chemical gas, wherein the cooling unit includes a heat exchanger for exchanging heat between the gas cylinder and the preparation tank.

Claim 20 (Currently Amended): The preparation apparatus according to claim ~~[[13]]~~ 14, ~~wherein the dissolution unit includes a bubbler element for supplying the chemical gas into the liquid, and wherein the bubbler element has a nozzle for forming fine bubbles of~~ the chemical gas.

Claim 21 (Originally filed): The preparation apparatus according to claim 20, wherein the nozzle is inclined by a predetermined angle relative to a vertical direction.

Claim 22 (Originally filed): The preparation apparatus according to claim 20, wherein the nozzle extends vertically, and the bubbler element further includes a deflection plate for guiding the bubbles in a predetermined direction.

Claim 23 (Originally filed): The preparation apparatus according to claim 13, further comprising:

a concentration measuring device for measuring the concentration of the chemical solution; and

a concentration adjusting device for adjusting the concentration of the chemical solution in accordance with the measured result fo the concentration measuring device.

Claim 24 (Currently Amended): A chemical solution preparation apparatus comprising:

a gas supply line for supplying a chemical gas;

a liquid supply line for supplying a liquid, which is one of pure water or a mixture having a predetermined composition;

a dissolution unit connected to a preparation tank for storing the liquid for dissolving the chemical gas in the liquid; and

at least either one of a gas discharge control unit for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid and a liquid discharge control unit for discharging the predetermined amount of the chemical solution, which is prepared by dissolving, wherein one of the gas discharge control unit and the liquid discharge control unit is operated at substantially the same time as the dissolution unit;

a concentration measuring device for measuring the concentration of the chemical solution, wherein the concentration measuring device includes at least one of the viscosity meter, a specific gravity meter, an ultrasonic wave velocity meter, and a specific conductance meter; and

a concentration adjusting device for adjusting the concentration of the chemical

solution in accordance with the measured result of the concentration measuring device, wherein the concentration adjusting device includes a controller for calculating the concentration of the chemical solution from the measured result of the concentration measuring device and controlling the amount of the chemical gas supplied to the dissolution unit from the gas supply line in accordance with the calculated concentration.

Claim 26 (Previously amended): The preparation apparatus according to claim 24, wherein the gas supply line includes a container in which the chemical gas is contained, and wherein the concentration measuring device calculates the amount of the used chemical gas by measuring the change in the weight of the container and calculates the concentration of the chemical solution from the amount of the used chemical gas.

Claim 27 (Originally filed): The preparation apparatus according to claim 13, further comprising an ice particle generator for generating ice particles, and wherein the dissolution unit causes contact between the ice particles and the chemical gas to dissolve the chemical gas in the liquid.

Claim 28 (Originally filed): The preparation apparatus according to claim 13, further comprising a gas purification unit for purifying the chemical gas with pure water.


Claim 29 (Currently amended): A chemical solution preparation apparatus

comprising:

~~a gas supply line for supplying a chemical gas;~~

~~a liquid supply line for supplying a liquid;~~

a dissolution unit connected to a preparation tank for storing a liquid, which is one of pure water or a mixture having a predetermined composition, for dissolving ~~the a~~ chemical gas, which is supplied from a gas supply, in the liquid to prepare a chemical solution; and

 a cooling unit connected to the preparation tank, for cooling the chemical solution during the preparation; and

a gas discharge control unit connected to the preparation tank, for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid during the gas dissolving to increase the purity of the chemical solution ~~by the dissolution unit, and~~

~~a controller for simultaneously operating the dissolution unit and at least one of the gas discharge control unit and the liquid discharge control unit.~~

Claim 30 (Originally filed): The preparation apparatus according to claim 29, wherein the dissolution unit is connected to a facility for fabricating electronic devices to dissolve used chemical gas disposed of by the fabrication facility in the liquid.

Claim 31 (Originally filed): The preparation apparatus according to claim 30, further

comprising a gas purification unit for purifying the chemical gas with pure water and providing the purified chemical gas to the fabrication facility.

Claim 32 (Previously amended): A chemical solution preparation apparatus comprising:

a gas supply line for supplying a chemical gas;

a liquid supply line for supplying a liquid;

a dissolution unit for dissolving the chemical gas in the liquid to prepare a chemical solution and cooling the chemical solution during the preparation; and

a gas collection unit connected to the dissolution unit and a facility for fabricating electronic devices, wherein the gas collection unit collects chemical gas from used chemical solution disposed of by the fabrication facility, and supplies the collected chemical gas to the dissolution unit.

Claim 33 (Originally filed): The preparation apparatus according to claim 32, wherein the gas collection unit collects the chemical gas by performing at least one of heating the chemical solution and forming inert gas bubbles in the chemical solution.

Claim 34 (Previously amended): The preparation apparatus according to claim 29, further comprising a flow controller arranged in the gas supply line.

Claim 35 (Originally filed): The preparation apparatus according to claim 29, wherein the chemical gas is contained in a predetermined container, and wherein the preparation apparatus measures the weight of the chemical gas in the container to calculate the amount of the chemical gas supplied to the preparation tank.

Claim 36 (Originally filed): The preparation apparatus according to claim 29, further comprising a hydrophobic filter for separating undissolved chemical gas from the chemical solution discharged by the dissolution unit, the separated chemical gas being supplied to the gas discharge control unit.

Claim 37 (Originally filed): The preparation apparatus according to claim 29, further comprising a concentration measuring device for extracting some of the chemical solution during the preparation and measuring the concentration of the chemical solution, the concentration of the chemical solution being adjusted to a predetermined concentration by supplying the chemical gas to the chemical solution during preparation.

Claim 38 (Originally filed): The preparation apparatus according to claim 29, further comprising a raw material supplying device for supplying a raw material that differs from the chemical gas to the prepared chemical solution.

Add the following claims:

Claim 39 (New): An apparatus for preparing a refined chemical solution using an industrial grade chemical gas, the apparatus comprising:

a dissolution unit for dissolving the industrial grade chemical gas, which is supplied from a gas supply, in a liquid stored in a preparation tank;

at least either one of a gas discharge control unit connected to the preparation tank, for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid and contains an impurity during the gas dissolving to increase the purity of the chemical solution and a liquid discharge control unit connected to the preparation tank, for discharging a predetermined amount of the chemical solution that contains an impurity during the gas dissolving to increase the purity of the chemical solution.

Claim 40 (New): An apparatus for preparing a refined chemical solution using an industrial grade chemical gas, the apparatus comprising:

a dissolution unit for dissolving the industrial grade chemical gas, which is supplied from a gas supply, in a liquid stored in a preparation tank to prepare a chemical solution;

a cooling unit connected to the preparation tank, for cooling the chemical solution during the preparation; and

a gas discharge control unit connected to the preparation tank, for discharging an adjusted amount of the chemical gas that was not dissolved in the liquid

Serial No.: 09/619,768
OA dated May 16, 2003
Prel Sub. dated September 16, 2003

and contains an impurity during the gas dissolving to increase the purity of the chemical solution.

C1

